

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 949 145 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

13.10.1999 Bulletin 1999/41

(51) Int. Cl.<sup>6</sup>: B65B 11/10, B65B 59/00

(21) Application number: 99105229.1

(22) Date of filing: 13.03.1999

(84) Designated Contracting States:

AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE

Designated Extension States:

AL LT LV MK RO SI

(30) Priority: 07.04.1998 IT BO980227

(71) Applicant: Baumer S.r.l.

40013 Castelfranco Emilia (Modena) (IT)

(72) Inventor: Gambetti, Mario

40014 Crevalcore (Bologna) (IT)

(74) Representative:

Gustorf, Gerhard, Dipl.-Ing.

Patentanwalt,

Bachstrasse 6 A

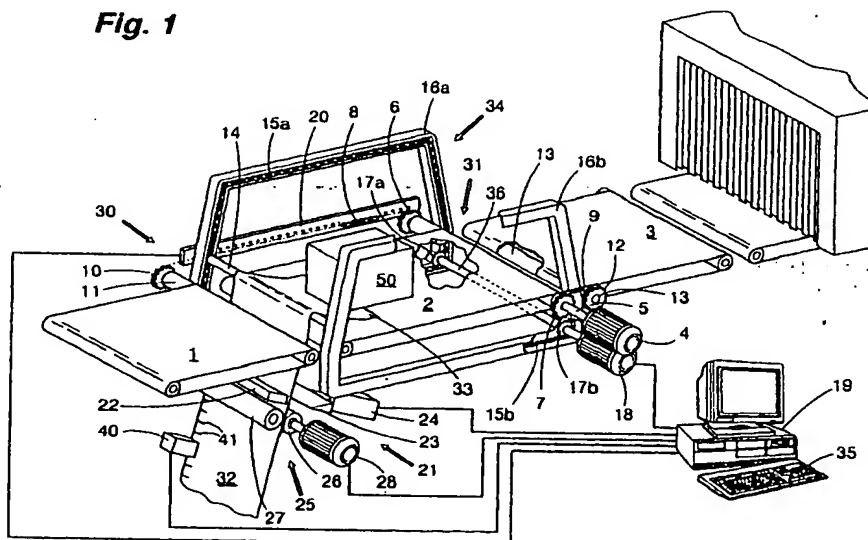
84036 Landshut (DE)

(54) **Method and machine for packaging of objects, by means of pieces of sheet material obtained from a continuous strip**

(57) -A method for packaging of objects(50), by means of pieces (32a) of sheet material, obtained from a continuous strip (32), comprises translation, with continual motion, of the objects (5) in individual succession, from upstream towards downstream, on three conveyors (1, 2, 3), and, for each object (50), during the wrapping operations, the transverse wrapping bar (14) is stopped during its path of longitudinal advance downstream, in a specific position, which is further forwards than the rear end of the object (50), and simultaneously,

the means (25) of supply of a continuous strip (32) of packaging material are stopped, in order then to actuate cutting means (21), which cut off a piece (32a) from the said continuous strip (32) which is rendered stationary, and, when the cutting off has taken place, the advance of the wrapping bar (14) is resumed, and the packaging of the object (50) itself is completed. -A machine for implementation of the said method.

Fig. 1



EP 0 949 145 A1

## Description

### Field of the invention

[0001] -The present invention relates to a method and a machine for packaging of objects by means of pieces of sheet material obtained from a continuous strip.

[0002] -More specifically, the present invention is included in the specific field of packaging of products, such as containers which are grouped in batches, in which individual pieces or sheets of heat-shrink material, obtained from a continuous strip which is unwound from a bobbin, are progressively cut individually, and again individually, are wrapped in the form of a sleeve around respective batches, and the individual assemblies of batch/piece thus obtained are conveyed to a heat-shrink oven, in order to shrink the pieces around containers.

### Description of the prior art.

[0003] -At present, specific machines of this type, see for example patents GB-1,355,466 and US-5,203,144, substantially comprise: a first conveyor, which is designed to supply the objects to be packaged, in spaced succession and with continual motion; a second conveyor, which is disposed downstream, and is slightly spaced relative to the first conveyor, thus providing a first aperture between the said first and the second conveyor, which is designed to translate the objects in succession, and with continual motion, along a wrapping surface; a third conveyor, which is disposed downstream, and is slightly spaced relative to the said second conveyor, in order to provide a second aperture between the said second and third conveyor, which is designed to receive in succession, and with continual motion, the partially wrapped objects presented by the said second conveyor; at least one suspended wrapping bar, which is oriented transversely relative to the direction of advance of the objects, which is designed to be translated through the said first and the said second aperture, along an orbital path which circumscribes the said second conveyor, the upper translation path of which is oriented from upstream towards downstream, which is designed to transport the packaging material from upstream towards downstream, above the object and beneath the transport surface, by being passed through the said second aperture; means for supplying the packaging material, which are disposed beneath and aligned in the vicinity of the intake end of the second conveyor, and are designed to cut off pieces of packaging material obtained from a continuous strip unwound from a bobbin, and to supply the said pieces in individual succession during the wrapping steps which are implemented by the wrapping bar; and synchronising means, which are designed to synchronise with one another the said first, second and third conveyors, the said suspended wrapping bar, and the said means for

supplying the packaging material.

[0004] -To summarise, in order to package the objects, these machines use the following operative method: translation of the objects longitudinally in individual succession from upstream towards downstream, with continual motion, on the three conveyor belts; cutting of the continuous strip of packaging material into successive pieces which have a specific length; supplying the ready-cut pieces in phase with arrival of the objects on the second conveyor, the front end of each piece being disposed between a respective object and the transport surface of the second conveyor; moving the suspended wrapping bar with continual motion, making it emerge from the base towards the top through the said first aperture, when the end part of the objects has passed beyond the first aperture itself, and then, in the downstream direction and subsequently downwards, making it pass through the said second aperture, before the objects reach the second aperture itself, in order to wrap the rear, upper and front parts of the individual objects, and in order to dangle the end part of the individual pieces between the second and the third conveyor; and finally, to fold the end part of the said pieces beneath the respective objects, and beneath the initial part of the pieces themselves, by translating the objects from the second to the third conveyor.

[0005] -As a result of the operative method used, and of the relative functional components adopted, according to which firstly the pieces are cut cyclically, are then supplied in succession on the second conveyor, and then drawn around the objects to be packaged, the aforementioned known machines require the use of rotary blades which are provided with clutches and brakes, and also the use of piece conveyor belts which are also provided with brakes and clutches, thus giving rise to a considerable cost of production of the packaging machine.

[0006] -In addition, again as a result of the operative method used, and of the relative components adopted, the aforementioned machines are suitable for packaging lines for high productivity, in which the format is changed rarely, and have the disadvantage that they are not designed for rapid, simple execution of the change of format.

## OBJECT OF THE INVENTION

[0007] -The object of the present invention is to eliminate the above-described disadvantages.

## SUMMARY OF THE INVENTION

[0008] -The invention, which is characterised by the claims, solves the problem of creating a method and a machine for packaging of objects by means of pieces of sheet material obtained from a continuous strip.

[0009] -The object of the present invention is thus a method for packaging of objects by means of pieces of

sheet material, obtained from a continuous strip, in an automatic packaging machine of the "sleeve" type, which wraps pieces of packaging material around the objects, in which the said machine comprises: first conveyor means which can supply the objects longitudinally in spaced succession; second conveyor means, which are disposed downstream and slightly spaced relative to the said first conveyor means, thus providing a first aperture between the said first and the second conveyor means, and can translate the objects longitudinally along a wrapping surface which has an intake end and an output end; third conveyor means, which are disposed downstream and slightly spaced relative to the said second conveyor means thus providing a second aperture between the said second and the said third conveyor means, which can receive longitudinally the objects presented by the said second conveyor means; wrapping means, which are disposed in the vicinity of the second conveyor means, and include at least one suspended wrapping bar, which is oriented transversely relative to the direction of advance of the objects, and is designed to be translated through the said first and the said second aperture, along an orbital path which circumscribes the said conveyor means, and is designed to transport the packaging material; strip supply means, which are disposed beneath and aligned in the vicinity of the said intake end of the second conveyor means, and are designed to supply a continuous strip of packaging material; cutting means, which are disposed between the strip supply means and the intake end of the second conveyor means, and are designed to cut the continuous strip of packaging material transversely; and synchronisation means, which are designed to synchronise the said means with one another; in which the said method is characterised in that the objects are translated with continual motion, in individual succession, from upstream towards downstream, and in that for each object to be packaged, there is: a) supply of the front end of the strip towards the intake end of the said second conveyor means, in phase with the arrival of the object on the second conveyor, the said front end of the strip being disposed between the object and the transport surface of the said second conveyor means; b) passage of a transverse wrapping bar upwards through the said first aperture, when the rear end of the object has passed beyond the said first aperture, and drawing of the strip supplied above the object and in the downstream direction; c) stoppage of the said transverse wrapping bar during its path of advance downstream, in a specific position which is further forwards than the rear end of the object, which advances with continual motion; d) simultaneously with the preceding step c), stoppage of the said means for supply of the strip of packaging material; e) actuation of the cutting means and cutting off of the continuous strip which is rendered stationary, thus obtaining a piece; f) resumption of the advance in the downstream direction of the transverse wrapping bar, and conveying the bar beyond the object

and then downwards, making it pass through the said second aperture before the object reaches the second aperture itself, dangling the end part of the piece between the said second conveyor means and the said third conveyor means; and g) translation of the object from the second conveyor means to the third conveyor means and placing the end part of the piece beneath the object.

[0010] -The object of the invention is also a machine of the aforementioned type, which is characterised in that detection means are provided along the longitudinal extension of the second conveyor, which can detect the position of longitudinal advance of the objects, in that the said wrapping means are actuated by means of a first servomotor with speed and phase control, in that the said means for supplying the material comprise strip supply means which are actuated by a second servomotor with speed and phase control, and in that the said synchronised means comprise a programmable control unit, which is connected to the said detection means, and can control the said first servomotor, the said second servo-motor, and the said cutting means.

[0011] -By means of use of a method and a machine of this type, the following results are obtained: rotary blades which are provided with brakes and clutches are not required; piece conveyor belts which are provided with brakes and clutches are not required; and the operations for the change of format are simplified.

[0012] The advantages which are obtained by means of the present invention consist mainly of: simplification of the wrapping operations; reduction of the costs of production of the machine for packaging of objects; an increase in the capacities of adaptation of the machine to the various formats of objects to be packaged; and reduction of the operative times for carrying out the change of format.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0013] -Further characteristics and advantages of the present invention will become more apparent from the following detailed description of a preferred practical embodiment, provided here purely by way of non-limiting example, with reference to the figures in the attached drawings, in which:

- figure 1 is a schematic perspective view of the packaging machine which is the subject of the present invention;
- figures 2, 3, 4, 4A, 5, 6, 7 and 8 are lateral schematic views, which are designed to illustrate the operative method which is the subject of the present invention, implemented by using a first embodiment of the wrapping bars; and
- figures 9, 10, 11, 11A, 12, 13, 14 and 15 are lateral schematic views, which are designed to illustrate the operative method which is the subject of the present invention, implemented by using a second

embodiment of the wrapping bars.

## SPECIFIC DESCRIPTION

[0014] -With reference to figure 1, the machine comprises three conveyors, indicated as 1, 2 and 3, which are disposed in series one after another, and are slightly spaced longitudinally, in order to define a first aperture 30 between the conveyors 1 and 2, and a second aperture 31 between the conveyors 2 and 3.

[0015] -A motor 4, of the electric type, actuates a shaft-roller 5, around which the second conveyor 2 is wound. At its opposite ends, there are keyed onto the said shaft-roller 5 crown gears rings 6 and 7, around which there are wound chains 8 and 9, such that the first chain, indicated as 8, is wound round a crown gear 10, which is keyed onto a shaft-roller 11, around which the first conveyor 1 is wound, and the second chain, which is indicated as 9, is wound around a crown gear 12, which is keyed onto a shaft-roller 13, around which the third conveyor 3 is wound.

[0016] -The second conveyor 2, i.e. the wrapping conveyor, is associated with wrapping means, which are generally indicated as 34, and consist substantially of at least one transverse wrapping bar 14, which orbits around the said second conveyor 2, and passes through the said first aperture 30 and the said second aperture 31, such that the bar 14 itself has its own opposite ends supported by two respective chains 15a and 15b, which are disposed opposite one another, and are moved along respective parallel planes which extend longitudinally and vertically, laterally relative to the second conveyor 2 itself, and are designed to slide inside grooves provided in respective frames 16a, 16b, which are illustrated here schematically.

[0017] -The chains 15a and 15b are actuated by means of a pair of toothed sprockets 17a and 17b, which are keyed onto the ends of a single shaft 36, which in turn is actuated by a first servomotor 18, of the speed and phase control type, for example a brushless motor which is provided with servocontrol, and is connected to a programmable control unit 19, PLC and/or computer and/or the like, which is programmable by means of a keyboard 35.

[0018] -Along one side of the conveyor 2, at a height which is the same as that along which the objects are moved, there is provided a position detector 20, for example of the opto-electronic type, which extends longitudinally, and is also connected to the programmable control unit 19.

[0019] -In the area beneath the conveyor 2, in the vicinity of its intake ends, there are disposed the means for supplying the packaging material, which comprise cutting mean 21, and, disposed further upstream relative to the direction of supply of a continuous strip 32, there are the supply means 25.

[0020] -The cutting means 21 substantially comprise a counter-blade 22 and a blade 23, which extend trans-

versely relative to the strip 32, such that the blade 23 is actuated by an actuator 24 of the electro-magnetic and/or pneumatic type and/or of a known type, which is connected to the programmable control unit 19.

[0021] -The supply means 25 substantially comprise a pair of rollers 27 and 26, which are preferably rubberised, between which the continuous strip 32 is engaged, such that the roller 26 is actuated by a second servomotor 28, of the speed and phase control type, for example a brushless motor which is provided with servocontrol, which is also connected to the programmable control unit 19.

[0022] -Upstream from the said supply units 25, there are disposed means for controlling unwinding of the bobbin containing the continuous strip 32, which are not described or illustrated here, since they are beyond the scope of the present invention, and are known to persons skilled in the art.

[0023] -With reference also to figures 2 to 8, the objects 50, 50a and 50b are supplied in individual succession and with continual motion from upstream towards downstream of the machine, and are translated longitudinally from one conveyor to the other.

[0024] -With reference to figure 2, when an object 50 reaches the first conveyor 1, it is translated towards the conveyor 2, and the position detector 20, which is disposed laterally relative to the conveyor 2, detects its position during its continual longitudinal advance in the downstream direction.

[0025] -When the object 50 reaches the position in which it straddles the first 1 and the second 2 conveyor, the programmable control unit 19, which has previously been programmed, has disposed the cutting means 21 in a non-operative position, i.e. with the blade 23 in a position which is spaced relative to the counter-blade 22, and the supply means 25 for the strip 32, which consist of the rollers 26 and 27 and of the servomotor 28, are active and controlled by the programmable control unit 19, in order to supply the continuous strip 32, at a speed of advance such that the front end 33 of the strip 32 itself is disposed at the intake end of the second conveyor 2, in phase with arrival of the object 50, and the said strip 32 is then supplied at a speed of advance which is substantially equivalent to the speed of advance of the objects 50.

[0026] -In this operative situation, as the object 50 and the strip 32 advance, see figure 3, the front end 33 of the strip itself is interposed between the base of the object 50 and the transport surface of the conveyor 2, whereas the detector 20 monitors the position of continual longitudinal advance of the object 50 itself.

[0027] -When the detector 20 informs the programmable control unit 19 that the rear end of the object 50 has passed beyond the said first aperture 30, again see figure 3, the programmable control unit 19 itself, by acting on the servomotor 18, takes the transverse wrapping bar 14 against the continuous strip 32, and subsequently, see figure 4, upwards and downstream, thus

drawing the continuous strip above the object and in the downstream direction, until the said bar 14 and the corresponding strip 32 are taken further forwards than the rear end of the object 50. During this step of drawing the strip 32, which is carried out by the bar 14, the programmable control unit 19, by acting on the servomotor 28, supplies the strip 32 at a speed which is greater than the previous speed, and substantially at a speed such as to compensate for the existing requirement for the strip.

[0028] -When the bar 14 reaches a specific position of its path of longitudinal advance in the downstream direction, which has previously been set in the programmable control unit 19, in which the bar 14 and the corresponding strip 32 are further forwards than the rear end of the object 50, which is advancing with continual motion, and in which a required length of the strip 32 has been extracted, as illustrated in figure 4, the said programmable control unit 19 stops the longitudinal advance movement of the bar 14 by stopping the servomotor 18, and simultaneously suspends the supply of the continuous strip 32, by means of stoppage of the roller 26, by stopping the servomotor 28.

[0029] -In this operative situation, the strip 32 is stationary (preferably little stretched), and the programmable control unit 19, by acting on the actuator 24, see figure 4A, takes the blade 23 against the counterblade 22, in order to cut off easily the continuous strip 32, and to obtain a piece 32a.

[0030] -In the period of time which is necessary in order to cut off the strip 32, in which the bar 14 and the supply of the strip are at a standstill, the object 50, which had its rear end disposed further upstream than the wrapping bar 14 when stopped, again see figure 4, continues to advance, see figure 4a, and in this context it should be pointed out that further supply of strip 32 is not necessary during the said advance, since the portion of strip 32 which has previously been extracted is used.

[0031] -After the piece 32a has been cut off, see figure 5, the blade 22 is returned to the rest position, for example by means of known resilient return means, and, again on the basis of prior programming, the programmable control unit 19 re-activates the servomotor 18, with consequent resumption of the movement of longitudinal advance of the transverse wrapping bar 14.

[0032] -With reference to figures 6 and 7, the speed of advance of the transverse wrapping bar 14, which is imparted by the servomotor 18, which in turn is controlled by the programmable control unit 19, is such as to take the wrapping bar 14 itself beyond the object 50 and downwards, as far as below the transport surface of the conveyors 2 and 3, by making it pass through the said second aperture 31, before the object 50 reaches the said second aperture 31 see figure 7, in order to make the end part 37 of the piece 32a dangle between the said second conveyor 2 and the said third conveyor 3.

[0033] -Finally, see figure 8, the object 50 is translated from the second conveyor 2 to the third conveyor 3, thus

disposing the end part 37 of the piece 32a beneath the object 50, and beneath the initial part 33 of the piece 32a itself.

[0034] -With reference to the preceding description, if it is necessary to modify the length of the piece 32a, in order to package an object which has a wrapping perimeter which is larger or smaller, i.e. in order to carry out the change of format, by means of the programmable control unit 19 which acts on the servomotor 18, a different position of stoppage of the bar 14 is set, along its path of longitudinal advance in the downstream direction, such that, more specifically, the bar 14 is stopped further upstream than the position shown in figure 4, in order to obtain a piece which has a shorter length, and conversely, the bar 14 is stopped further downstream than the position shown in figure 4, in order to obtain a piece which has a longer length. In this context, however, it is understood that the different positions of stoppage of the bar 14 must always be disposed further downstream (further forwards) than the rear end of the object 50 which is advancing, in order, during the step of cutting off of the stationary strip 32, to reduce the distance (to approach) between the stationary bar 14 and the rear part of the advancing object 50, such that supply of the strip 32 is not required during the step of cutting off with the strip stationary, even though the object 50 continues to advance.

[0035] -Again with reference to the preceding description, in order to modify the length of the piece 32a for a change of format, also by means of the programmable control unit 19, which acts on the servomotor 28, which actuates and controls the supply means 25 for the strip 32, it is possible to set a different phase ratio between the objects 50 which reach the conveyor 2, and the supply units 25 themselves, in order to position the front end 33 of the strip 32 further upstream or downstream, relative to the longitudinal extension of the object 50. More specifically, whilst maintaining the same stoppage position for the bar 14 as that indicated in figures 4 and 4A, when the end 33 of the said strip 32 is inserted sooner than indicated in figures 2 and 3, i.e. when the front end 33 is disposed further downstream relative to the longitudinal extension of the object 50, a piece with a longer length is obtained, and conversely, when the end 33 of the said strip 32 is inserted later than indicated in figures 2 and 3, i.e. when the front end is disposed further upstream relative to the longitudinal extension of the object 50, a piece with a shorter length is obtained.

[0036] -This possibility of setting a different phase ratio between the objects which reach the conveyor 2, and the supply means 25 themselves, in order to position the front end 33 of the strip 32 further forwards or backwards relative to the longitudinal extension of the object 50, also makes it possible to be able to change the stop position of the bar 14, whilst keeping the length of the piece 32a constant, and more specifically, by inserting the end 33 of the said strip 32 further forwards

than indicated in figures 2 and 3, it is possible to dispose further upstream the stop position of the wrapping bar 14, and conversely, when the end 33 of the said strip 32 is inserted further back than indicated in figures 2 and 3, it is possible to dispose further downstream the stop position of the wrapping bar 14.

[0037] -With reference to the preceding description, by acting on the programmable control unit 19, it is possible to vary the longitudinal stop position of the wrapping bar 14, and/or the position of insertion of the front end 33 of the strip 32, relative to the longitudinal extension of the base of the object 50 to be packaged, such that substantially, it is possible to set easily and quickly the optimum parameters for wrapping of objects which have various shapes and/or various dimensions, and/or various ratios of height to length, without having to replace the so-called "proportioned parts".

#### Second embodiment of an operative machine

[0038] -Figures 9 to 15 illustrate the operative method which is the subject of the present invention, implemented using a second embodiment of an operative machine, in which, substantially, the wrapping means for transporting the strip 32 and the individual pieces 32a comprise at least one pair of bars, indicated as 14 and 14a, which are disposed in succession one after another.

[0039] -With reference to figures 9, 10 and 11, and as in the preceding embodiment, the objects 50, 50a and 50b are translated from upstream towards downstream with continual motion, and the front end 33 of the strip 32 is disposed between the base of the object 50 and the conveyor 2.

[0040] -When the object 50 has passed beyond the aperture 30, the transverse wrapping bars 14 and 14a, which are disposed in succession one after the other, support a portion of strip 32 which is being supplied upwards and in the downstream direction, and the transverse bar 14 and the corresponding strip 32 are disposed further downstream than the rear end of the object 50 which is advancing with continual motion.

[0041] -When the bar 14 reaches a specific position of its path of longitudinal advance, which is illustrated here in figure 11, the programmable control unit 19, as in the previous case, commands stoppage of the movement of longitudinal advance of the bars 14-14a, by acting on the servomotor 18, and suspension of the supply of the strip 32, by acting on the servomotor 28, and then, see figure 11A, cutting off of the strip 32, by acting on the actuator 24, in order to obtain the piece 32a.

[0042] -In this embodiment also, during the period of time which is necessary for cutting of the strip 32, in which the two bars 14-14a and the supply of the strip 32 are at a standstill, the object 50, which had its rear end disposed further upstream than the wrapping bar 14 when stopped, again see figure 11, has continued to advance, see figure 11A, and during the said advance,

further supply of strip 32 is not necessary, since the portion of strip 32 which has previously been extracted and carried by the bar 14 further downstream than the rear end of the said object 50 is used.

[0043] -After the piece 32a has been cut off, see figure 12, the programmable control unit 19 commands actuation of the servomotor 18, with consequent resumption of the movement of longitudinal advance of the bars 14 and 14a, and more specifically, see also figure 13, the bar 14 wraps the piece around the object 50 as previously described, whereas in this case, the bar 14a supports the end part 37 of the piece 32a itself, in order to keep it spaced from the object 50, in order to prevent undesirable contacts/adhesions between the said end part 37 and the part of the piece 32a itself which has already been wrapped, since these contacts/adhesions are particularly undesirable in view of the known electrostatic charges to which some plastic packaging materials are subject.

[0044] -With reference to figures 14 and 15, by being passed through the second aperture 31, the bar 14 and the bar 14a are taken below the surface of translation of the objects, before the object 50 reaches the aperture 31, in order to make the final end 37 of the piece 32a dangle between the said second 2 and the said third 3 conveyor, see figure 14, in order, as in the preceding case, for the end part 37 of the piece 32a to be folded beneath the initial part 33 of the piece 32a itself, by means of translation of the object 50 from the said second conveyor 2, to the said third conveyor 3.

[0045] -Again with reference to figure 1, optionally, the machine which is the subject of the present invention can also be provided with a reading device 40, for example an optical reader of the optoelectronic type, which is disposed before the cutting units 21, is connected to the programmable control unit 19, and is designed to read marks 41 which are disposed longitudinally in succession along the continuous strip 32, in order to communicate to the programmable control unit 19 the stage of advance of the strip 32 itself during the packaging operations.

[0046] -By means of this configuration, it is possible to control continuously and accurately the quantity of material supplied, and, for example, by counting the marks 41 which succeed one another, it is possible to determine the length of strip which has been unwound since the previous cut, in order to cut the pieces 32a to a length which is millimetrically accurate and calibrated.

[0047] -In addition, again in this configuration, it is also possible to provide automatic adjustment of the supply of the strip 32, in order to correct any errors of excessive or insufficient supply by the supply means 25 of the strip 32, caused for example by possible slippage (relative movements) between the strip 32 and the rollers 26-27. In fact, if the programmable control unit 19 is provided with a pre-adjusted management and control programme, which, briefly, serves the purpose of measuring the quantity of strip supplied in relation to the signals



received from the reading device 40, in order then to act on the servomotor 28 and/or on the servomotor 18, of the speed and phase control type, it is possible to supply a greater or lesser quantity of the strip 32 in the wrapping operative cycle in progress, and/or in the successive cycles, in order to compensate for any errors detected.

[0048] -The said technical-functional characteristic is required in particular in the case of packaging units with strip material which is provided with successive decorative motifs, in which, in order to ensure that the image of the motif is in the correct position on the object to be packaged, the front end 33 of the strip 32 must be supplied accurately in phase with the arrival of the objects 50, and in addition, the strip 32 itself must be cut off at a specific point of its longitudinal extension, in order to ensure that the motif is in the correct position relative to the length of the pieces 32a, and in order to avoid phase displacement of the supply for cutting of the successive pieces with corresponding decorative motifs.

[0049] -With reference to the description which illustrates the operative method and the corresponding machine, it is apparent that the latter can also be implemented with a different machine structure, of the electrical and/or electronic and/or mechanical type, without departing from the operative concepts expressed in the following claims.

[0050] -The description of the above-described operative methods and machines are provided purely by way of non-limiting example, and it is thus apparent that

all changes and/or variants can be made to them which are suggested by practice and by their utilisation or use, within the scope of the following claims.

## Claims

1. Method for packaging of objects by means of pieces of sheet material, obtained from a continuous strip, in an automatic packaging machine of the "sleeve" type, which wraps pieces of packaging material around the objects, in which the said machine comprises:

- first conveyor means which can supply the objects longitudinally in spaced succession;
- second conveyor means, which are disposed downstream and slightly spaced relative to the said first conveyor means, thus providing a first aperture between the said first and the second conveyor means, and can translate the objects longitudinally along a wrapping surface which has an intake end and an output end;
- third conveyor means, which are disposed downstream and slightly spaced relative to the said second conveyor means, thus providing a second aperture between the said second and the said third conveyor means, which can receive longitudinally the objects presented by

the said second conveyor means;

- wrapping means, which are disposed in the vicinity of the second conveyor means, and include at least one suspended wrapping bar, which is oriented transversely relative to the direction of advance of the objects, and is designed to be translated through the said first and the said second aperture, along an orbital path which circumscribes the said conveyor means, and is designed to transport the packaging material;

- strip supply means, which are disposed beneath and aligned in the vicinity of the said intake end of the second conveyor means, and are designed to supply a continuous strip of packaging material;

- cutting means, which are disposed between the strip supply means and the intake end of the second conveyor means, and are designed to cut the continuous strip of packaging material transversely; and

- synchronisation means, which are designed to synchronise the said means with one another; in which the said method is characterised in that the objects (50, 50a, 50b) are translated with continual motion, in individual succession, from upstream towards downstream, and in that for each object (50) to be packaged, there is:

a)-supply of the front end (33) of the strip (32) towards the intake end of the said second conveyor means (2), in phase with the arrival of the object (50) on the second conveyor (2), the said front end (33) of the strip (32) being disposed between the object (50) and the transport surface of the said conveyor means (2);

b)-passage of a transverse wrapping bar (14) upwards through the said first aperture (30), when the rear end of the object (50) has passed beyond the said first aperture (30), and drawing of the strip (32) supplied above the object (50) and in the downstream direction;

c)-stoppage of the said transverse wrapping bar (14) during its path of advance downstream, in a specific position which is further forwards than the rear end of the object (50), which advances with continual motion;

d)-simultaneously with the preceding step c), stoppage of the said means (25) for supply of the strip (32) of packaging material;

e)-actuation of the cutting means (21) and cutting off of the strip (32) which is rendered stationary, thus obtaining a piece

(32a) which is separate from the piece (32);

f)-resumption of the advance in the downstream direction of the transverse wrapping bar (14), and conveying the bar beyond the object (50) and then downwards, making it pass through the said second aperture (31) before the object (50) reaches the second aperture (31) itself, dangling the end part (37) of the piece (32a) between the said second conveyor means (2) and the said third conveyor means (3); and

g)-translation of the object (50) from the second conveyor means (2) to the third conveyor means (3), and placing the end part (37) of the piece (32a) beneath the object (50).

2. Method according to claim 1, characterised in that the position of stoppage of the transverse wrapping bar (14) is varied along its path of advance from upstream towards downstream.
3. Method according to claim 1, characterised in that the position of insertion of the front end (33) of the strip (32) is varied relative to the longitudinal extension of the base of the object (50) to be packaged, whilst the said object (50) is being translated from the first conveyor means (1) to the second conveyor means (2).
4. Method according to claim 1, characterised in that the position of stoppage of the transverse wrapping bar (14) is varied along its path of advance from upstream towards downstream, and/or the position of insertion of the front end (33) of the strip (32) is varied relative to the longitudinal extension of the base of the object (50) to be packaged, whilst the said object (50) is being translated from the first conveyor means (1) to the second conveyor means (2), in relation with the format of the objects (50) to be packaged.
5. Machine for packaging of objects by means of pieces of sheet material, obtained from a continuous strip, in an automatic packaging machine of the "sleeve" type, which wraps pieces of packaging material around the objects, in which the said machine comprises:

- first conveyor means which can supply the objects longitudinally in spaced succession;
- second conveyor means, which are disposed downstream and slightly spaced relative to the said first conveyor means, thus providing a first aperture between the said first and the second conveyor means, and can translate the objects

longitudinally along a wrapping surface which has an intake end and an output end;

- third conveyor means, which are disposed downstream and slightly spaced relative to the said second conveyor means, thus providing a second aperture between the said second and the said third conveyor means, which can receive longitudinally the objects presented by the said second conveyor means;
- wrapping means, which are disposed in the vicinity of the second conveyor means, and include at least one suspended wrapping bar, which is oriented transversely relative to the direction of advance of the objects, and is designed to be translated through the said first and the said second aperture, along an orbital path which circumscribes the said conveyor means, and is designed to transport the packaging material;
- strip supply means, which are disposed beneath and aligned in the vicinity of the said intake end of the second conveyor means, and are designed to supply a continuous strip of packaging material;
- cutting means, which are disposed between the strip supply means and the intake end of the second conveyor means, and are designed to cut the continuous strip of packaging material transversely; and
- synchronisation means, which are designed to synchronise the said means with one another; characterised in that detection means (20) are provided, which are disposed along the longitudinal extension of the second conveyor (2), and can detect the position of longitudinal advance of the objects (50, 50a, 50b); in that the said wrapping means (34) are actuated by means of a first servomotor (18) with speed and phase control; in that the said means (32) for supplying the material comprise units (25) for supplying the strip (32), which are actuated by means of a second servomotor (28) with speed and phase control; and in that the said synchroniser means comprise a programmable control unit (19), which is connected to the said detection means (20), and can control the said first servomotor (18), the said second servomotor (28), and the said cutting units (21).

6. Machine according to claim 5, characterised in that the said wrapping means (34) comprise at least one pair of transverse wrapping bars (14, 14a), which are supported in succession one after the other; in that the bar (14) which is further forward in the said pair of bars (14, 14a) transports the strip (32) and the corresponding piece (32a) during the wrapping steps; and in that the second bar (14a) which is further back in the said pair of bars (14, 14a) supports



the end part (37) of the piece (32a).

7. Machine according to claim 5 or claim 6, characterised in that there is also provided a reading device (40), which is disposed before the cutting units (21); in that the said reading device (40) can read marks (41) which are disposed along the strip (32); and in that the said reading device (40) is connected to the programmable control unit (19).

10

15

20

25

30

35

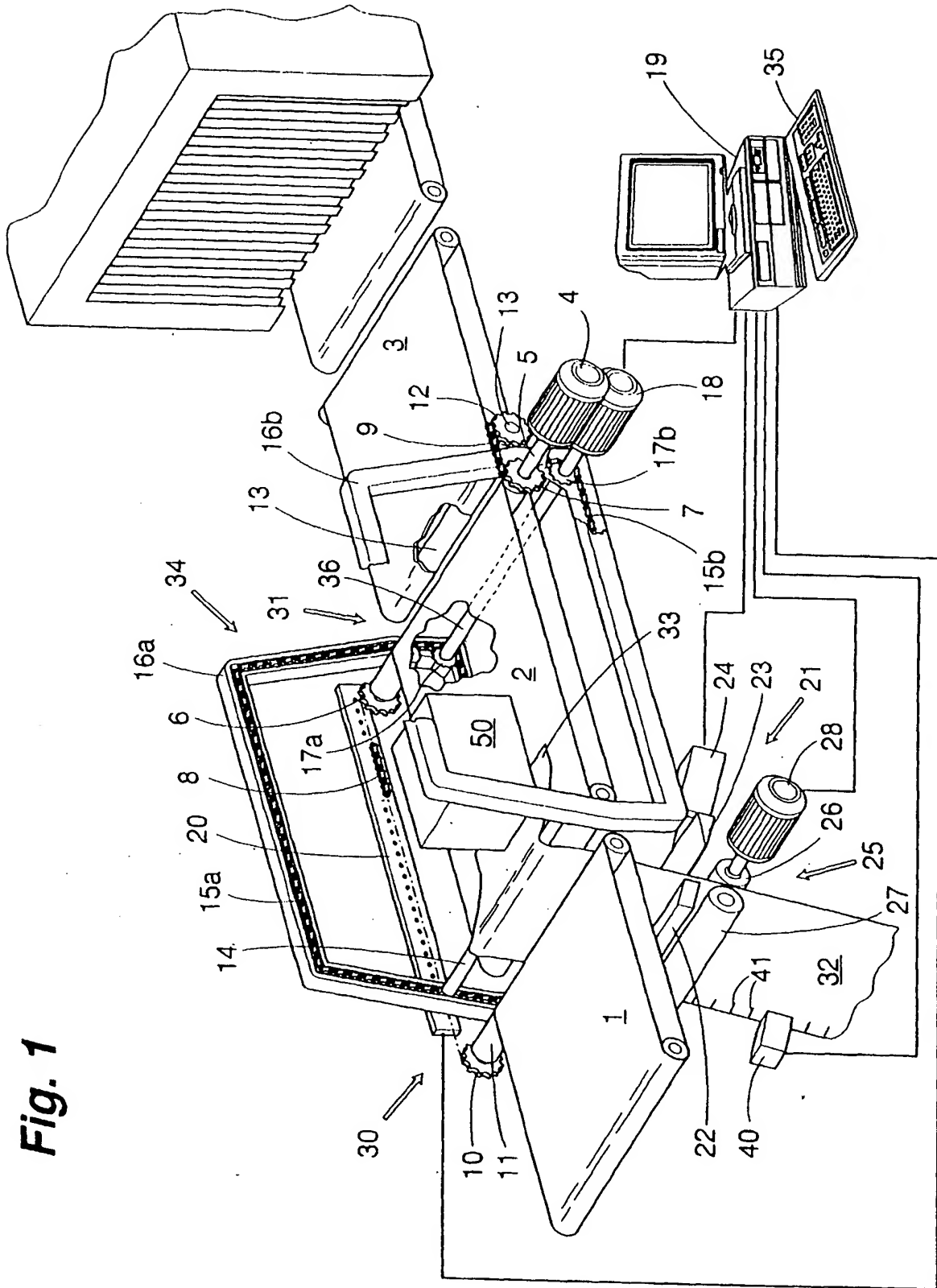
40

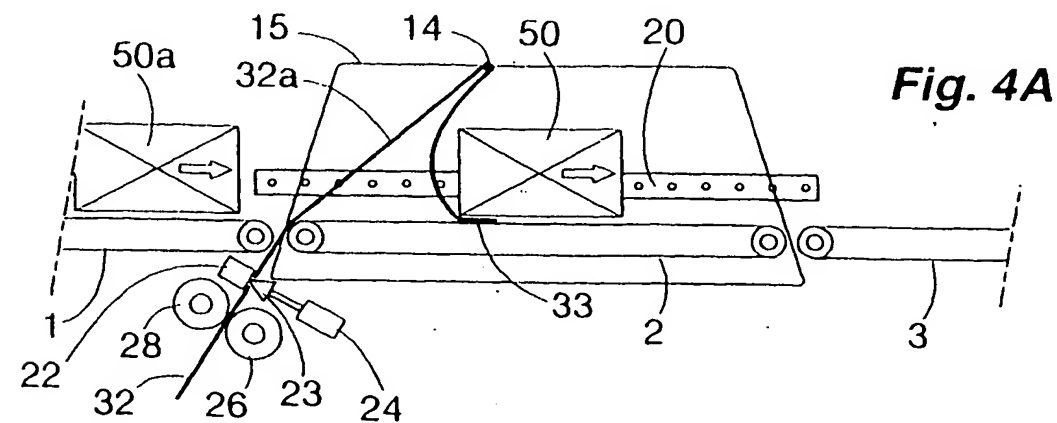
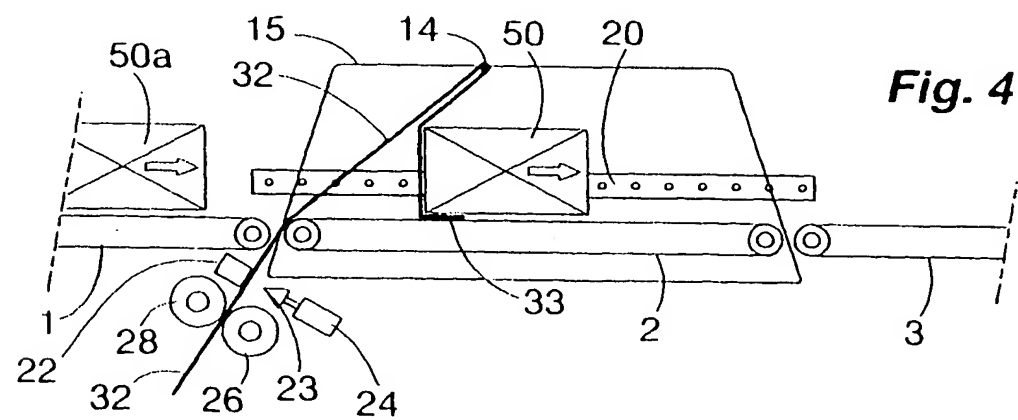
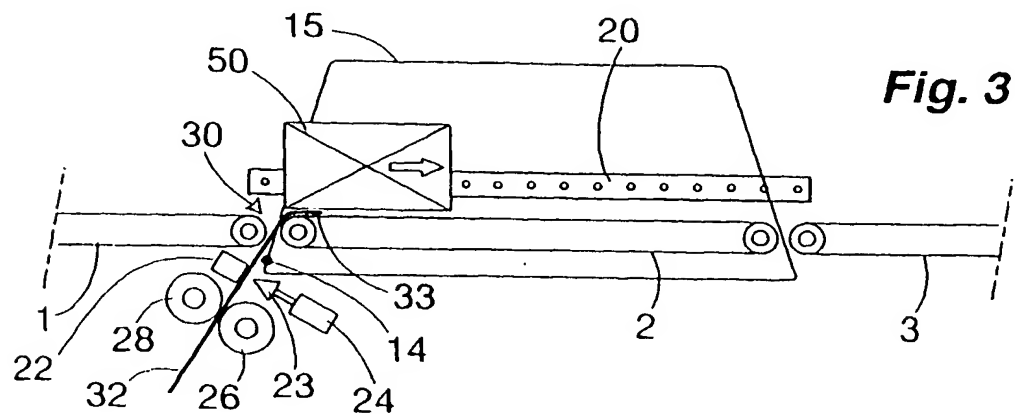
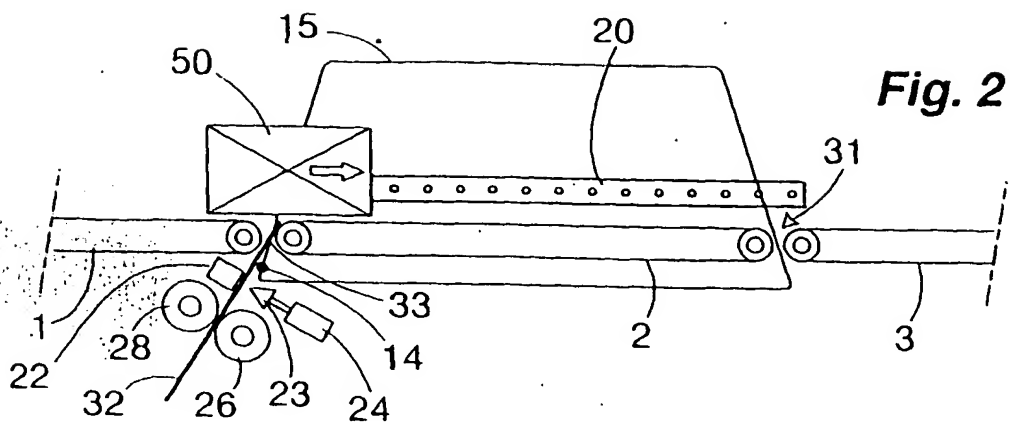
45

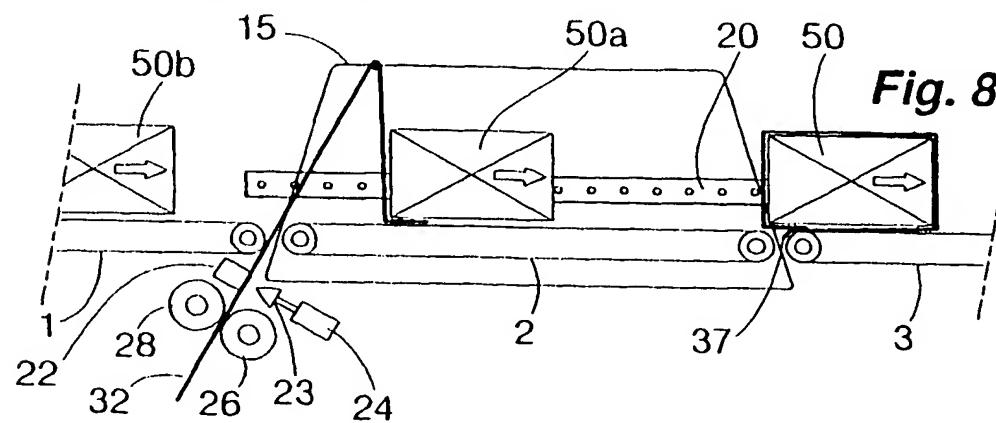
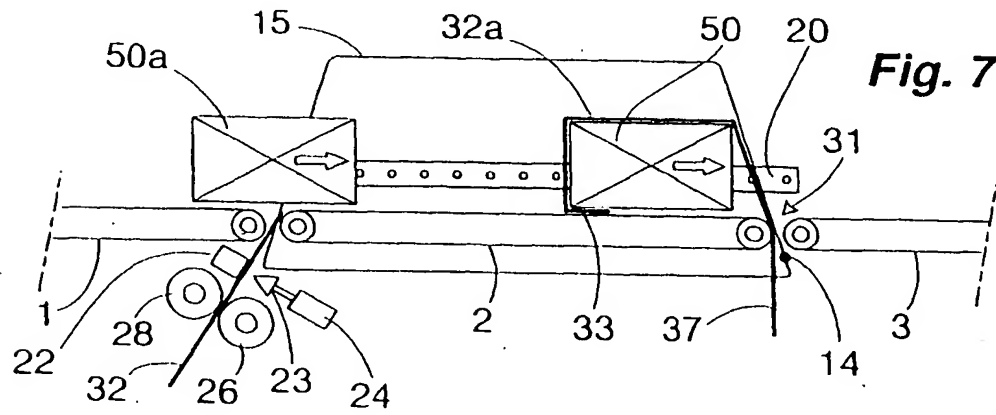
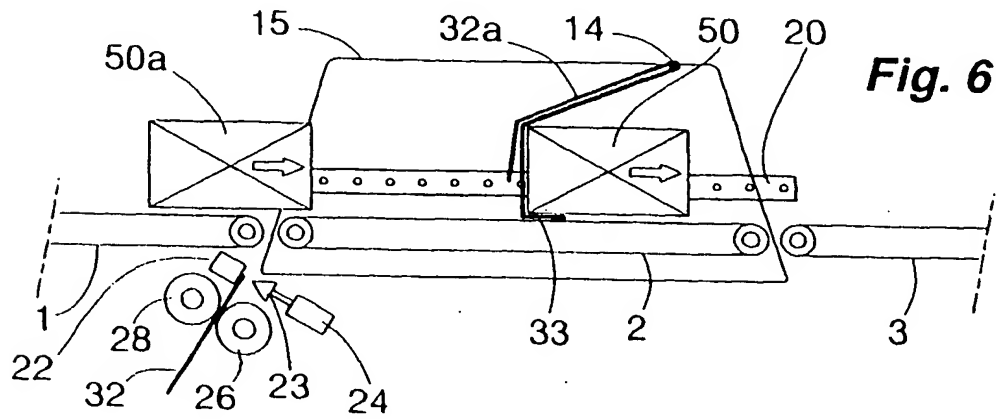
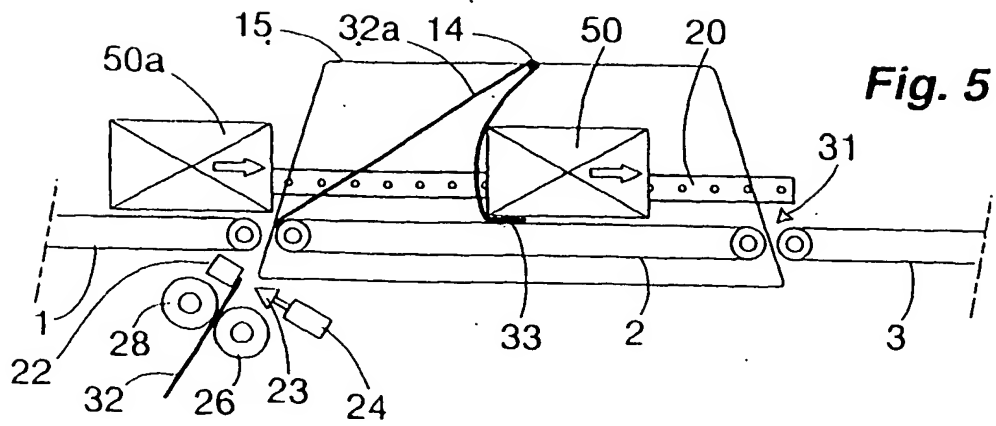
50

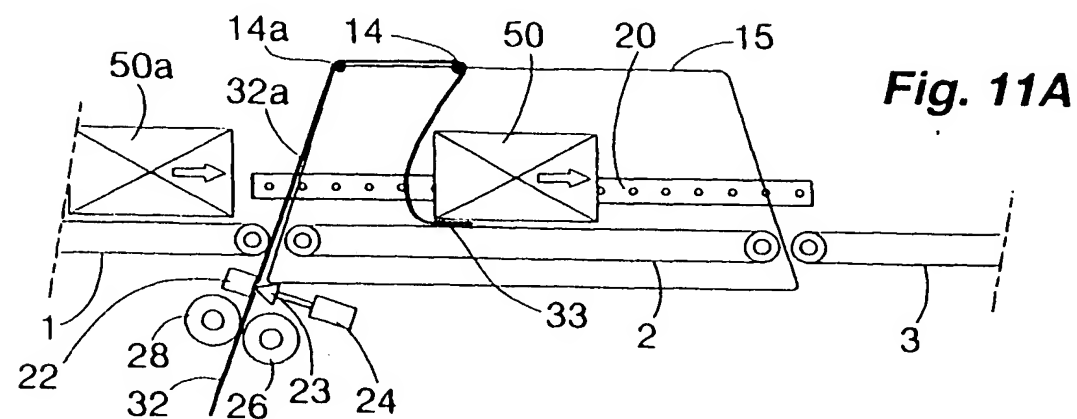
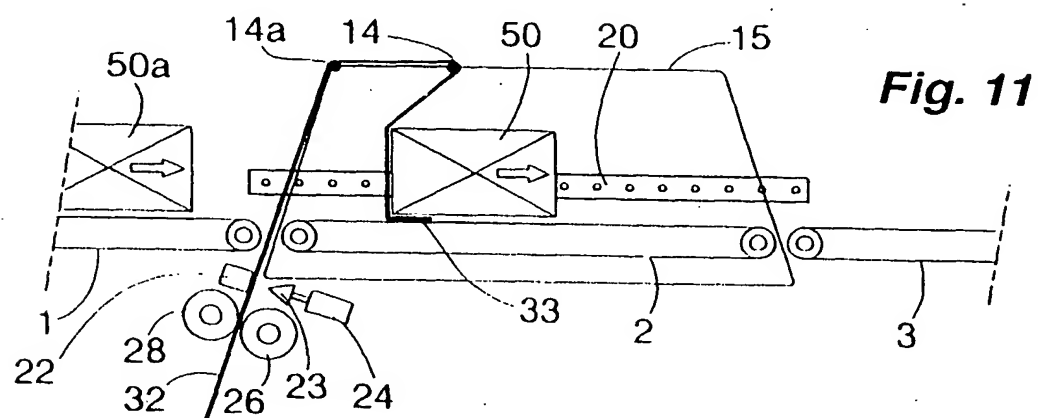
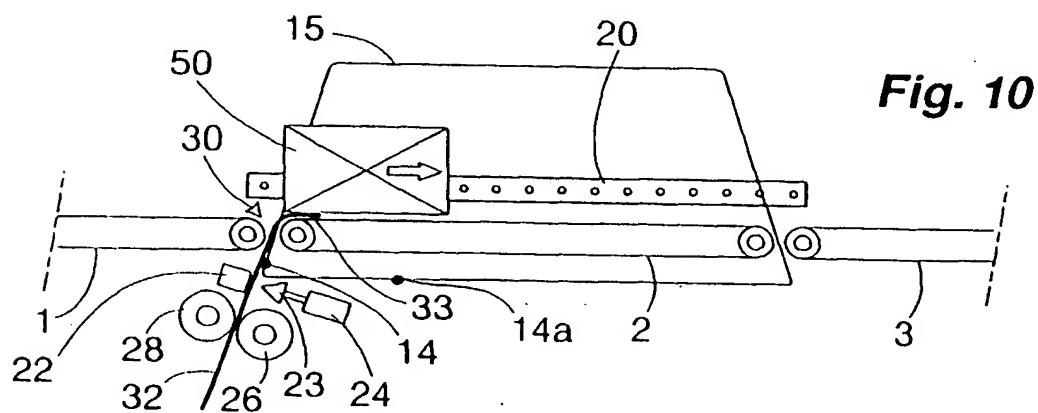
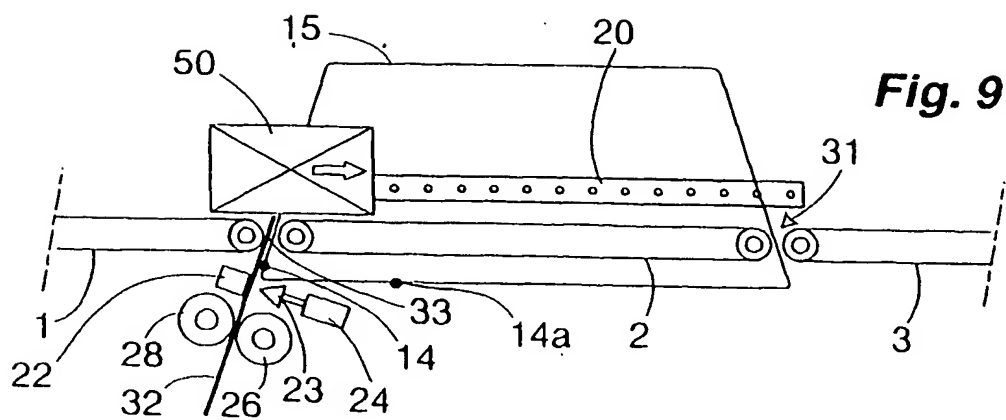
55

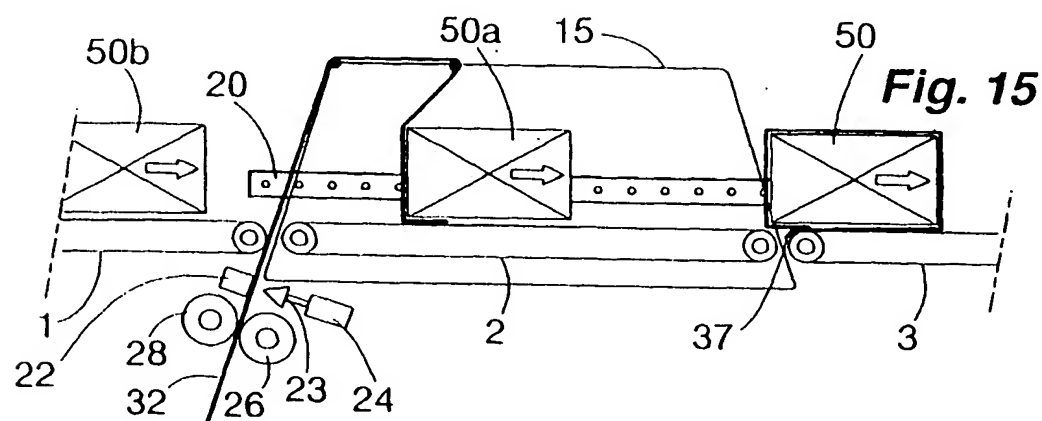
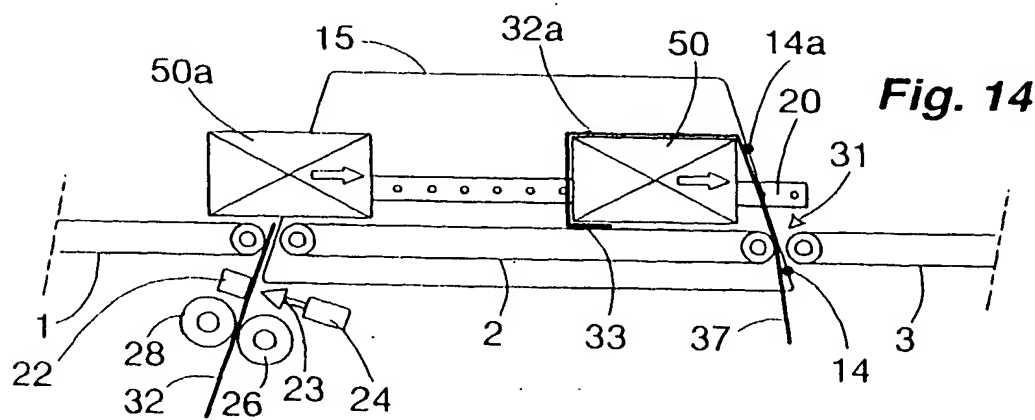
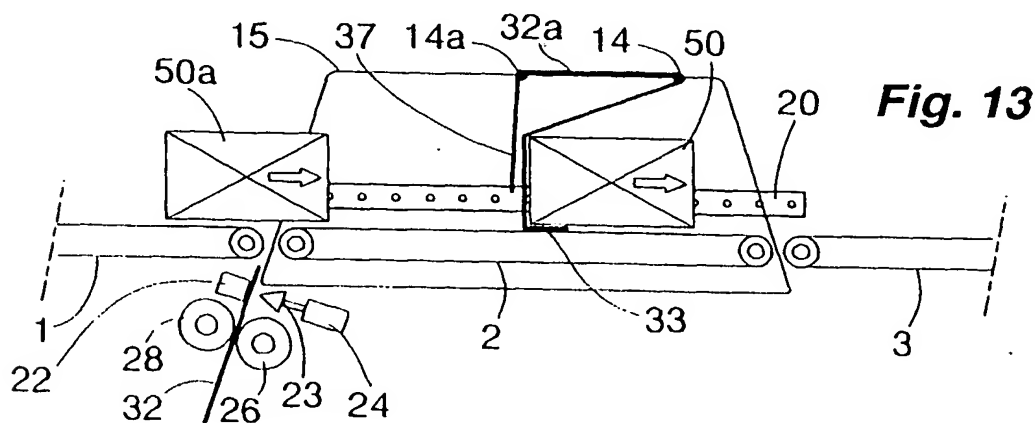
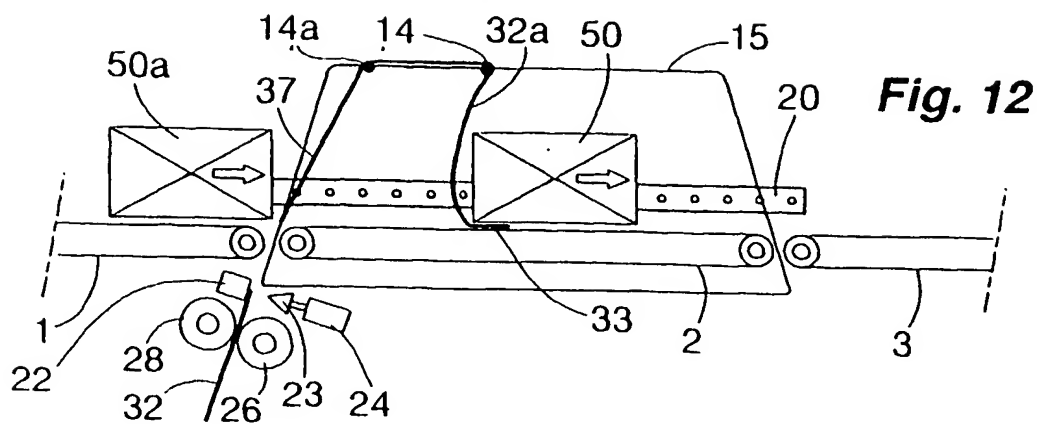
Fig. 1















European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 99 10 5229

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 581 747 A (DIMAC) 2 February 1994 * claim 1; figures 1,2 * -----	1,5	B65B11/10 B65B59/00
A	EP 0 629 551 A (BAUMER) 21 December 1994 * abstract; figure 6 * -----	6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>10 June 1999</b>	Examiner <b>Grentzius, W</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons</p> <p>&amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 10 5229

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

10-06-1999

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 581747	A	02-02-1994	IT	1258028 B	20-02-1996
			AT	135973 T	15-04-1996
			DE	69301973 D	02-05-1996
			DE	69301973 T	10-10-1996
			ES	2087703 T	16-07-1996
EP 629551	A	21-12-1994	IT	1263438 B	05-08-1996
			US	5463846 A	07-11-1995

EPO FORM P459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82